

Dynamic Design: The Cleanroom

Levels of Clean

STUDENT ACTIVITY

BACKGROUND

This activity will be used to model the conditions inside the cleanroom. The shoeboxes will represent the rooms inside the cleanroom. The flour will be used to model contamination. Two different tests will be conducted to demonstrate the need for certain protocols in the cleanroom.

PROCEDURE

Assembly

1. Obtain the materials from your instructor. These should include three or four shoeboxes, rubber bands, scissors, both Scotch® and black electrical tape, and plastic wrap.
2. Cut two doorways in one of the shoeboxes (on opposite sides of the box) and one doorway in the other two. These doorways should be approximately the same size.
3. Staple the boxes together such that the doors from the boxes are lined up. The box with the two doors should be located in the middle and the two boxes with only one door should be on either end. You may want to use black electrical tape to tape the sides of the doorways. Now place one index card between the boxes at the location of the doors. Pulling the cards up during the activity will represent the door opening. Think of other variables that would need to be controlled when you begin taping the boxes together.
4. Cut a window at the bottom of each box, and tape some plastic wrap over the hole that will be used to make qualitative observations during the activity.
5. Apply pieces of black electrical tape "loops" (take a length of the of black electrical tape and fasten one end to the other, sticky side out) to the inside of each of the boxes.



Johnson Space Center



Part I

6. Measure 10 g. of flour that will be used in this activity. Spread the newspaper on your desk. Place the measured amount of flour in the first box.
7. Poke the straw through the plastic wrap. Several people should be in charge of the index cards (doors). They should be opening and closing them randomly. While this is happening, one person should blow into the straw causing the flour to fly into the air inside the boxes. Observe the concentration of dust in each of the rooms and record your observations in the space below.

Room	Observations
1	
2	
3	

8. Once the dust has settled, remove the two-sided tape from each of the rooms and tape onto this sheet below with descriptions.

Room	Tape and Description
1	
2	
3	

9. Working in your groups, devise a way to decrease the level of dust that moves between rooms. This may include the order in which the doors are opened and closed. Write your description below.

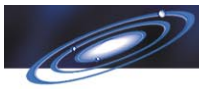
Part II

10. Add new pieces of black electrical tape in the boxes. Repeat the test using the procedure written above.

11. Record the results below.

Room	Concentration of Dust Observations
1	
2	
3	

Room	Tape and Description
1	
2	
3	



12. Write a recommendation for opening and closing doors in the cleanroom based on the evidence from this activity.

13. Be prepared to share your method from Procedure 9 and the results with the class.